

UTILITY PATENT  
APPLICATION TRANSMITTAL

(Only for new nonprovisional applications  
under 37 CFR 1.53(b))

Attorney Docket No.

001461

Total Pages

First Named Inventor or Application Identifier

Masafumi BABA, Akihiko NAKAMARU and Jin KOJIMA

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APPLICATION ELEMENTS FOR:  
PROCESSOR

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2. ☒ Specification Total Pages [28]

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b. ☐ Copy from prior application (37 CFR 1.63(d))  
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i. ☐ Deletion of Inventor(s)

Signed statement attached deleting inventor(s) named in prior application,  
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5. ☐ Incorporation by reference (useable if box 4b is checked)

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**PAGE 2 OF 3**

10. ☐ English translation Document (if applicable)
11. ☐ Information Disclosure Statement ☐ Copy of IDS Citation
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13. ☒ Return Receipt Postcard (MPEP 503)
14. ☐ Small Entity Status is claimed.
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*Ronald F. Naughton*

Date: November 2, 2000

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PROCESSOR

## BACKGROUND OF THE INVENTION

## 5 1. Field of the Invention

The present invention relates to a processor for printing a requested print job via a recording medium or a network, and more particularly to a processor in which a function to execute a print job is extended.

## 10 2. Description of the Related Art

In general, if a printer is connected to a computer main body a user is using, when a text file is created, the contents of the file are stored after confirming the contents by looking at what is displayed on a screen of the computer main body or what is printed through the printer.

However, as a system, in which a plurality of users share a common printer for printing files they create, there is a print system in which a network is configured by UNIX, which is an operating system or OS that can deal with a multiple users and in which one or a plurality of printers are connected to the network, whereby a plurality of users perform printing on the printers via the network. With this system, the printers are not used exclusively by the specific users but the printers are configured so as to be used by all the users having accesses to the system.

In order to realize a system like this, a server device is connected to the network, and one or a plurality of printers are connected in turn to the server device.

When there are requests for printing made by the respective users, an lp print service program is activated and print data of the print requests from the respective users are printed in order.

In this print system, the print data stored in the medium or the print data requested for printing via

the network is read and the print data so read is then  
outputted to the printer for printing. However, when the  
requested print data has been printed on the printer, the  
print server device is configured so as to automatically  
5 delete the print file stored in a print data storing  
unit.

Even when there occurs a jam or the like on the  
printer side, as long as the print file remains in the  
print data storing unit, it is possible to recover the  
10 print file. However, since the print file is deleted as  
soon as the printing of the file is completed, it is not  
possible to print the data of the same print file. To  
cope with this, in a case where the same print data is to  
be reprinted on the printer, another request for  
15 printing the same print data has to be made.

In addition, even in a case where the print  
data from the medium or the network is outputted directly  
from a print job reading unit to the printer, if there  
occurs a jam or a failure in printing a specific page on  
20 the printer side, it is not possible to perform re-  
printing without another request for printing for the  
same print data.

Furthermore, although it can be conceived that  
the print file is left at the print data storing unit  
25 without being automatically deleted, in order to deal  
with a tremendous number of requests for printing jobs,  
the capacity of the storing unit has to be gigantic.  
Moreover, the operator is required to perform an  
additional operation of deleting the print data which has  
30 been printed by confirming that the data has become  
unnecessary.

Additionally, in a case where a print job  
requested by the print server device is printed on the  
printer, the print file of the print job in question is  
35 stored in the print data storing unit, and the requested  
printing is performed after the print data is read in the  
lp print service unit. This causes a problem that it

takes time since the print job arrives at the print server device before the requested printing is initiated on the printer.

As is described above, it can be conceived that the print data is outputted directly from the print job reading unit to the printer and, in this method, since the print data is outputted to the printer without being read in the storing unit on its way to the printer, the time required from the request to the printing can be reduced.

However, although even if this method can reduce the time, in the event that there occurs trouble on the printer side or that the same print data is to be re-printed, not only does the method require another request for printing but also an advantage inherent in the lp print service, that a multiple accesses from a plurality of users can be dealt with, is lost.

To cope with this, a problem must be solved that the time required from a request for printing to the completion of the requested printing is reduced while making effective use of the lp print service.

Additionally, in a print system constituted by a print server device and a printer, when a request for printing is made, the lp print service receives a print job and outputs print data after spooling the same data.

At this time, since the lp print service is designed to normally output requested print jobs in a sequential fashion, in a case where the printing sequence is to be changed, the printing sequence has to be changed by separately making use of the function of the lp print service.

The print jobs accepted by the lp print service have attribute values of priority and the lp print service is provided with a function to change the printing sequence by changing the priority in printing sequence by changing in turn the attribute values.

However, this function can be used for a single

print job, and therefore, in a case where a plurality of print jobs are spooled, there are caused several problems.

5           Namely, the priority has to be changed for every print job each time. Additionally, this function is a function to determine the priority by numerical values, and since the numerical value has a range (with the UNIX, 0 to 39), in a case where the number of print jobs exceeding the range are stored, printing cannot be  
10           performed in an expected sequence. Furthermore, a plurality of print jobs are stored, since the stored print jobs are printed one by one end, if the priority is changed for each printing, printing may be performed in an erroneous sequence depending on changing timings.

15           In a case where print jobs accepted and spooled by the lp print service unit are to be printed in a sequence following a specific condition, the conventional technologies have not been able to provide effective means. Printing is performed in an erroneous sequence,  
20           which is attributed to the fact that a process in which the priority is changed and a process in which the lp print service unit outputs to a device control filter cannot be performed in synchronism with each other.

25           Due to this, once a specific condition is set, the print priority must be determined in accordance with the condition so determined and the print sequence must be automatically changed.

30           To this end, an object of the present invention is to increase the convenience of a print server device by making effective use of the function of an lp print service and further improving the function as the print server device.

#### SUMMARY OF THE INVENTION

35           With a view to solving the problems, according to an aspect of the present invention, there is provided a processor comprising a processing unit for registering a print request command of an accepted print job, storing a

print file of the print job and reading out print data of the file in accordance with the print request command and a device control filter for analyzing and processing the print data read out by the processing unit so as to  
5 output the print data so analyzed and processed to a printer, the processor being characterized in that the processing unit sequentially reads out the print data in accordance with the print request command for supply to the device control filter as a part of the file is  
10 stored, thereby implementing print data reading and print processing in a parallel fashion, whereby a printing time can be reduced.

Furthermore, the processing unit of the processor puts the print job in a print wait condition, releases  
15 the print job from the print wait condition by selecting the print request command in accordance with a specific condition for determining an output sequence and reads out print data of the released print job for supply to the printer, whereby the printing sequence of the print  
20 job can be automatically or optionally changed through a simple operation.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The above object and features of the present invention will be more apparent from the following  
25 description of the preferred embodiments with reference to the accompanying drawings, in which:

Fig. 1 is a schematic diagram showing the configuration of a conventional print server device,

Fig. 2 is a schematic diagram showing the  
30 configuration of a print server device according to a first embodiment of the present invention,

Fig. 3 is a schematic diagram showing the configuration of a print server device according to the first embodiment which is adapted to deal with a  
35 plurality of print jobs and a plurality of printers,

Fig. 4 is a schematic diagram showing the configuration of a print server according to a second

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Fig. 5 is a flowchart showing an operation of a print job reading unit of the print server device according to the second embodiment,

Fig. 7 is a flowchart showing an operation of the print server device which follows the flowchart shown in Fig. 6.

Before describing embodiments of the present invention, the related art and disadvantages inherent therein will be described with reference to figures in association therewith.

A print server device 1 is composed of a print job reading unit 4, a print data storing unit 5, an lp print service unit 6, a spool file 7 and a device control filter 8. The print job reading unit 4 is designed to accept a print job 3 from the network, and a printer 2 is connected to the device control filter 8. The print job 3 may be not only print data requested for through the network but also a request for printing data stored in a medium such as a magnetic tape, a magneto-optical disc (MO) and a CD-ROM.

Following this, when the print data is written in

the spool file 7, the device control file 8 is activated and reads out the print data written in the spool file 7 for analysis and conversion thereof. Then, the device control filter 8 analyzes and processes the print data and converts the data into a print format for the printer 2. The data processed herein is sent to the printer 2 for printing.

Here, another storing unit may be prepared separately from the print data storing unit 5 is prepared, so that the print data written in the print data storing unit 5 is temporarily in the separately provided storing unit.

Then, when data of the print data file has been printed, even if the print file in the print data storing unit 5 is automatically deleted, since the print data stored in the separate storing unit is left, when the print data requested for printing is to be re-printed, the print data stored in the separate storing unit is read out for printing. Note that a large capacity need not be prepared and that the operator is not required to perform a deleting operation each time if the separately prepared storing unit is set such that functions to and not to store print data are provided with the unit, whereby the stored print data is deleted with the passage of a predetermined length of time or the print data previously written is deleted upon receipt of a new request for printing.

However, with the configuration of the conventional print server device shown in Fig. 1, the aforesaid problems cannot be solved.

Referring to Figs. 2 to 7, an embodiment of a print server device according to the present invention will be described below which can solve the aforesaid problems and can increase the convenience of the print server device by improving the function thereof.

[First Embodiment]

Fig. 2 shows a specific configuration for a print

server device for a print system according to the present invention. The print server device 1 comprises a print job reading unit 4, a print data storing unit 5, an lp print service unit 6, a spool file 7, a device control filter 8 and a control unit 9. Note that the print job reading unit 4, the print data storing unit 5, the lp print service unit 6, the device control filter 8 and the control unit 9 are configured so as to execute their own functions. The basic configuration of a print server device 1 shown in Fig. 2 is similar to that of a conventional print server device 1 shown in Fig. 1 and, in Fig. 2, like reference numerals are given to portions similar to those shown in Fig. 1. The print server device 1 according to the first embodiment is different from the conventional print server device in that the former device is provided with the control unit 9.

The control unit 9 has a function to set a flag for identifying the end of print data in a print file that is to be stored in the print data storing unit 5, and this flag setting function was not provided in the prior art. Note that although not shown in Fig. 2, an information table for storing flag information is prepared within the control unit 9, whereby the control unit 9 controls the flag information with the information table based on information supplied from the print job reading unit 4.

In the print system like this, when the print job 3 arrives at the print job reading unit 4 through a request for printing, the print job reading unit 4 reads print data of the print job and initiates the storing of a print file in the print data storing unit 5. The control unit 9 detects the initiation of the storing of the print file and sets a flag to 1. Note that this flag is 0 when the storing of the print file in the print data storing unit 5 is completed.

Then, at the time of initiation of writing the print data into the print data storing unit 5, the print job reading unit 4 sends out a print request command to the

lp print service unit 6. Then, receiving this print request command, the lp print service unit 6 writes the print data stored in the print data storing unit 5 into the spool file 7.

5 With the prior art server device shown in Fig. 1, a  
print request command is sent to the lp print service  
unit 6 after the entirety of the print data of the print  
job requested has been completely stored in the print  
data storing unit 5. With the server device according to  
10 the first embodiment, a print request command is sent to  
the lp print service unit 6 and print data is written  
into the print data storing unit 5 as soon as the storing  
of the print data into the print data storing unit 5 has  
been initiated. Namely, the reading of the print data  
15 and processing of the same are designed to be performed  
at the same time in a parallel fashion.

20 The device control filter 8 reads out the print data written in the spool file 7 in a sequential fashion in a case where the print data of the print job in question is recognized as being read or as long as the flag sent from the control unit 9 stays at 1, and the print data so read out is then analyzed and converted for output to the printer 2. Then, the printer 2 performs printing based on data sent out from the device control filter 8.

25           When the print job reading unit 4 has completed the  
writing of the entirety of the print data into the print  
data storing unit 5, the control unit 9 set the flag to 0  
from 1 and output a flag 0 to the device control filter  
8. Here, having recognized that the flag has been set to  
30   0, the device control filter 8 can recognize that the  
print file which is being analyzed and processed has been  
entirely written into the print data storing unit 5.

35 Here, if the device control file 8 is designed to read out completely the print data that has been written in the spool file 7 under a file name in question, even if the flag becomes 0 while the print data of the print job in question is being analyzed and processed, there is

no risk of the printing of the relevant print job being interrupted.

5       The device control filter 8 reads entirely the print data written in the print data storing unit 5 via the lp print service unit 6, carries out a print process and ends printing. Thereafter, the printer 2 is put in a wait condition.

10       When the printing of the requested print job has been completed, a print file in association with the print job written in the print data storing unit 5 is deleted. Alternatively, the print file is not necessarily deleted immediately after printing has been completed but may be deleted with the passage of a predetermined length of time or may be deleted at the  
15       request of the user.

      Here, for example, in the event that a trouble such as a jamming occurs in the printer 2, the device control filter 8 stops the delivery of data to the printer 2 and interrupts the printing.

20       However, even while the printing is interrupted, the writing of the print data is performed and the print data of the print job in question continues to be written in the print data storing unit 5, and the writing of the entirety of the print data is completed. Then, detecting  
25       that the flag from the control unit 9 has been set from 1 to 0, the device control filter 8 can recognize that the print data of the print job in question remains in the print data storing unit 5 even while the printing is being carried out. Due to this, the device control  
30       filter 8 may read out the remaining print data for printing process after having waited for the recovery of the printer 2 from the trouble or may read out the print data of the print job from the beginning thereof and carries out the printing process.

35       Print data written in the print data storing unit 5 may be deleted after a print job in question has been completely printed, or the same data may be deleted with

the passage of a predetermined length of time or through the operation by the user, this being determined depending on the writing capacity of the print data storing unit 5.

5           With the prior art print server device, however, in the event that trouble occurs, not only is the printing interrupted but also the print data written in the print data storing unit 5 is deleted. Due to this, in a case where the requested print job is to be re-printed,  
10           another request for printing had to be made from the beginning.

          When a trouble occurs while printing is being carried out, since print data remains in the spool file 7, the lp print service unit 6 cannot read out the print data. By detecting a condition like this, even after the  
15           print data has been completely written in the print data storing unit 5, the print data should not be deleted but be held. According to this configuration, when the printer 2 is recovered from the trouble, if the already  
20           written print data is read out from the beginning for output, the re-printing of the requested print job can easily be carried out.

          As has been described heretofore, being different from the prior art server device in which, after the  
25           print data has been completely written, a request for printing is sent out to the lp print service unit 6 and thereafter print data is printed, with the server device according to the present invention, since the reading of print data from a medium or a network and the printing of  
30           the print data so read are carried out in parallel, a time from receiving a request for printing until initiating printing the requested printing can be reduced, and a recovery process for re-printing due to a jam in the printer 2 can be performed at a high speed,  
35           and the necessity of resetting of the medium at the time of recovery is obviated, this functioning to reduce the load on the operator.

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Note that although whether print data is being read or has been completely read is determined through the setting condition of the flag by the control unit 9, data representing the end of reading may be imparted to the end of print data at the print job reading unit 5.

In this case, before the print data of the requested print job has been completely written into the print data storing unit 5, the print data in the lp print service unit 6 is sent to the device control filter 8 for a printing process. Then, when the data imparted to the end of the print data is detected, the printing in question is interrupted, and the printer 2 is put in a wait condition.

Furthermore, even when the printer 2 is in the midst of performing the relevant printing, the print data storing unit 5 can accept the following print jobs and write them therein in a sequential fashion. When this occurs, the flag at the control unit 9 stays at 1, but since print data read out by the lp print service unit 6 under a file name of the print job is sent to the device control filter 8, the printing process can be executed sequentially.

As shown in Fig. 2, a print server device has been described heretofore in which a single printer prints a single print job, but in reality, in a print server device connected to a network, as a function inherent in the lp print service, a plurality of print jobs can be printed on a plurality of printers.

To this end, a specific example of a print server device adapted to deal with a plurality of inputs and a plurality of printers will be described in Fig. 3.

The configuration of a server device 1 shown in Fig. 3 is based on the configuration shown in Fig. 2, and like reference numerals are given to like portions.

The print server device 1 shown in Fig. 3 has a print job reading unit 4 and an lp print service unit 6. Further, a print data storing unit 5 comprises storing

unit 51 to 54 provided for storing print data  
corresponding to print jobs 31 to 34. In addition, a  
plurality of printers 21 to 24 are connected respectively  
to device control filters 81 to 84 within the server  
5 print device 1, and although not shown in Fig. 3, there  
are provided spool files 7 corresponding to the device  
control filters 81 to 84. Then, similar flags 91 to 94  
to those described with reference to Fig. 2 are provided  
in the control unit 9 so as to correspond to the print  
10 jobs 31 to 34.

Note that, although in Fig. 3 the number of printers  
2 shown is made equal to the number of print jobs 3, and  
actually four printers and four print jobs are shown, the  
number of printers 2 may be smaller than that of the  
15 print jobs 3.

Next, the function of the print server 1 shown in  
Fig. 3 will be described below.

When requests for print jobs 31 to 34 arrive at the  
print job reading unit 4 sequentially, the print job  
20 reading unit 4 stores print data of the requested print  
files separately in respective storing unit 51 to 54.  
When this occurs, for example, when even a byte of the  
print data of the print job 31 is written in the storing  
unit 51, recognizing that the print data is being read,  
25 the print job reading unit 4 sets a flag 91 in the  
control unit 9 to 1 in correspondence with the name of  
the print file of the print job in question. Flags  
corresponding to the other print jobs 32 to 34 are  
similarly set in correspondence with the names of the  
30 print files.

The print job reading unit 4 writes the requested  
print data in the storing unit 51 to 54 for the  
respective files of the print jobs and informs the lp  
print service unit 6 of the file names of the respective  
35 print jobs 31 to 34.

Next, having received the respective file names, the  
lp print service unit 6 selects a printer in a wait



condition and sends the print data of the respective files to respective device control filters 81 to 84 via a spool unit 7. Here, the device control filters 81 to 84 can recognize, from the file names informed by the lp print service unit 6, which print data is being processed. Then, the device control filters 81 to 84 can understand from the file names which flag among the flags 91 to 94 existing in the control unit 9 be identified, and for example, in Fig. 3, it is seen that the device control filter 81 may look at the set condition of the flag 91.

With the corresponding flags 91 to 94 being set at 1, the respective device control filters 81 to 84 judge that there is print data to be printed and sequentially read out print data designated by the respective file names from the spool file 7 to continue processing the data of the respective file names. Then, the respective printers 21 to 24 print the data which have been processed for printing.

Thereafter, the respective device control filters 81 to 84 execute operations similar to those done by the device control file 8 shown in Fig. 2 when the respective flags 91 to 94 are set to 0 from 1 and end printing the respective print jobs 31 to 34. Then, the device control filters and printers are put in a wait condition sequentially as they finish printing and then they accept the following print job 3n.

Note that since the flags are used only for notification of the completion of printing similarly to the print server device 1 shown in Fig. 2, the notification of such completion of printing may be carried out without using the flags and data representing the end of printing may be imparted to the end of the print data. Alternatively, the device control filters 81 to 84 may be designed to be informed of the file names and sizes of respective files responsible for printing at the printer in question. Whether or not the print data

is being processed for printing may be determined.

As has been described heretofore, even with the print server device adapted to deal with the plurality of print jobs and the plurality of printers, since the reading of print data from the medium or network and the processing the same data for printing are designed to be carried out in parallel with each other, a time from receiving a request for printing until initiating printing the requested printing can be reduced, and a recovering process for re-printing due to a jam in the printer 2 can be performed at a high speed, and the necessity of resetting of the medium at the time of recovery is obviated, this functioning to reduce the load on the operator.

[Second Embodiment]

While in the first embodiment the functions of the print server device are improved not only to reduce the time required for processing for printing at the print server device but also to facilitate a recovery process even if there occurs a trouble in the printer, in a second embodiment, by making use of the function of lp print service, which is provided with the print server device, the print sequence is designed to automatically be changed for an accepted print job in accordance with a specific set condition.

In the second embodiment, in order to synchronize the process for changing the priority in printing with a process in which an lp print service unit performs a process for outputting to a device control filter, a hold function and a hold release function are used which are originally provided with the lp print service unit.

Here, the hold function means a function to hold a target print job stored and not to output it to the device control filter even when it is its turn to be printed, and the hold condition means a condition in which the lp print service unit does not output print data to the device control filter even when it is its

turn to be printed.

Additionally, the hold release function means a function to output a print job held in the hold condition when a time for the print job to be printed comes, and a  
5 print wait condition means a condition in which the lp print service unit outputs print data to the device control filter when a time for a print job to be printed comes.

The printing sequence can be changed using these  
10 functions even if a function to set the priority is not used.

A specific configuration example of the print server device according to the second embodiment is shown in Fig. 4. The printer server device 1 shown in Fig. 4 is  
15 based on the configuration of the printer server device shown in Fig. 2, and like reference numerals are given to like portions.

However, a print information table 10 is additionally provided with the printer server device 1  
20 shown in Fig. 4 and it can store information in association with a print job from a print job reading unit 4. Then, a function is added to the print job reading unit 4 to forcibly impart a print job 3 a command denoting a hold condition when the print job is accepted.  
25 Furthermore, a device control filter 8 is designed to create a filter doing file while outputting printing data to a printer 2.

Note that Fig. 4 mainly shows a flow of control commands, and a print data storing unit 5 is omitted and  
30 hence is not shown therein, but the print data storing unit 5 is also provided similarly to the configuration shown in Fig. 2.

Next, the function of the printer server device 1 shown in Fig. 4 will be described.

35 When a request for printing a print job 3 is made at the printer server device 1, the print job reading unit 4 accepts the print job 3.

With the prior art printer server device 1, as long as the user does not set a hold condition for printing, the print job reading unit 4 sends a print request command in association with a print job 3 in question to the lp print service unit 6. Then, the lp print service unit 6 proceeds with the processing by putting the print job in a print wait condition in accordance with the sent print request command.

In the printer server device 1 shown in Fig. 4, when the print job reading unit 4 accepts a print job, the print job reading unit 4 forcibly affixes to the print job 3 a command representing a hold condition. For example, a holding option "-H hold" is affixed as representing the hold condition, and the following print request command is created together with the file name of the print job.

lp -H hold to print file

Having accepted the print job 3, the print job reading unit 4 sends the created print request command to the lp print service unit 6. In other words, whether or not a hold condition is designated, hold conditions are set for all the print jobs.

When this occurs, that a print file for the requested print job is stored in the print data storing unit 5 by the print job reading unit 4 is similar to the prior art printer server device 1, and when print jobs arrive, they are sequentially stored. Then, at this point of time, since a hold option is affixed to the print request command sent thereto, the lp print service unit 6 holds the printing of the print job in question.

With this condition being maintained, since every print job is in the hold condition, even if the request for printing has already been made, the printing continues to be held. To cope with this, the condition for the printing sequence is set in advance in the control unit 9. The priority in initiating printing print files stored in the print data storing unit 5 can

be determined by the condition so set. The control unit 9 operates to release the hold condition for the name of a print file in question.

5 Then, specific examples will be shown below which can be realized under specific conditions set.

Assume that the print job reading unit 4 sequentially accepts print jobs Job-A to Job-E shown below.

Job Names	User Names	Size
1. Job-A	(User=ccc)	(Size=12767)
2. Job-B	(User=aaa)	(Size=9324)
3. Job-C	(User=ccc)	(Size=54365)
4. Job-D	(User=bbb)	(Size=8835)
5. Job-E	(User=aaa)	(Size=42545)

10 Here, assume that a specific condition is set in which the respective print jobs are printed for each user name a, b, c in that order, hold options for the respective print request commands are released in the order shown below.

Job Names	User Names
1. Job-B	(User=aaa)
2. Job-E	(User=aaa)
3. Job-D	(User=bbb)
4. Job-A	(User=ccc)
5. Job-C	(User=ccc)

15 Alternatively, assume that a specific condition is set in which the respective print jobs are printed in the order from the smallest to the largest, hold options for the respective print request commands are released in the order shown below.

Job Names	Size
1. Job-D	(Size=8835)
2. Job-B	(Size=9324)
3. Job-A	(Size=12767)
4. Job-E	(Size=42545)
5. Job-C	(Size=54365)

Specific conditions are set in the control unit 9 in

which the respective print jobs are selected in these orders so that the respective print jobs are printed in those orders and direct a print wait condition for the lp print service unit 6 in accordance with the specific  
5 condition. Here, in order to realize a print wait condition, the hold option for the corresponding print request command is changed and a command for releasing the hold condition is created.

10 In a case where a print job is put in a print wait condition using the hold release function of the lp print service unit 6, for operation thereof, the control unit 9 imparts a hold release option "-H resume" representing the hold release and creates the following command to be sent to the lp print service unit 6.

15 Lp -I request ID -H resume

Thus, by releasing print jobs in the hold condition from the print hold in the order in accordance with the specific condition, the lp print service unit 6 sequentially reads out print files thereof and writes in  
20 the spool 7, and the device control filter 8 performs an analyzing process based on the written print data and outputs the result of the process to the printer 2. The print file of the print data which has been completely printed is deleted with the passage of a predetermined  
25 length of time or at the time of completion of the printing.

Note that even if the user does not designate the "-H hold" at the time of making a request for printing, a print request is made forcibly in the hold condition.  
30 However, since there may be a case where the user enters a hold condition, relevant information is stored in the print job information table 10 so that a case where the user designates the "-H hold" is discriminated from a case where the user does not designate the "-H hold".

35 As to a hold condition in the print job information table 10, information entry for a single print job is constituted by a list of request IDs and forced hold

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flags.

5       The request ID represents information for specifying  
print jobs prepared by the lp print service unit 6. The  
forced hold flag is a flag representing that the print  
10   job reading unit 4 forcibly has created a hold condition  
for making a print request, and a print job in which this  
flag is ON or is set at 1 is released from the hold  
condition in response to the condition set in the control  
unit 9. A print job in which the flag is OFF or is set  
10   at 0 is not released from the hold condition by the  
control unit 9 and hence is not printed until the user  
clearly performs a hold release operation.

15       The control unit 9 confirms information on  
respective print jobs stored in the print job information  
table 10 for print files stored without being printed and  
deletes the print job information entries for the print  
jobs which have been printed and lost.

20       In a case where the device control filter 8 is  
performing a printer output process, a filter doing file  
is informed to the control unit 9. Then, the control  
unit 9 confirms that there exists no filter doing file,  
releases print jobs from the hold in accordance with the  
designated condition or for example, in the order of  
priority according to a specific condition of ascending  
25   or descending priority and puts the print jobs in the  
print wait condition.

30       The prior art printer server device 1 is not  
provided with a feature that the device control filter 8  
creates a filter doing file representing that printing is  
under way.

35       As has been described heretofore, if a condition  
representing the printing order is set in the control  
unit 9 in advance or a condition representing a printing  
order desired by the user is left ready for entry in the  
control unit 9, the printing sequence can be changed  
through a simple operation, and automatically and freely,  
without performing operations for setting the priority

for each printing job.

Next, referring to flowcharts shown in Figs. 5 to 7, the detailed operations of the print job reading unit 4 and the control unit 9 will be described below.

5       As shown in Fig. 5, the operation of the print job reading unit 4 is initiated when the print job reading unit 4 receives a print job 3 from the user, and the print job reading unit 4 checks whether or not the received print job is provided with a hold option command  
10       "-H hold" which is designated by the user (S1).

      If the hold condition is designated by the user (Y), the reading unit 4 stores a forced hold flag OFF in the print job information table 10 (S4).

15       At this time, the "-H hold" is already affixed to the option of the request command. On the other hand, in Step S1, if the hold condition is not designated by the user (N), the reading unit 4 stores a forced hold flag ON for the print job in the print job information table 10 (S2).

20       The print job reading unit 4 stores the information in the print job information table 10 and creates a print request command by adding the "-H hold" to the hold option of a request command lp (S3).

25       Next, the reading unit 4 completes the processes in Steps S3 and S4 and sends out a print request command for an accepted print job to the lp print service unit 6 in a state in which the option hold "-H hold" exists in the request command of every print job (S5).

30       Then, the reading unit 4 obtains request IDs corresponding to the request commands sent out from the lp print service unit 6 (S6) and adds another entry into the print job information table 10 (S7).

35       This ends the operation in which the print job reading unit 4 requests the lp print service unit 6 for printing the accepted print jobs.

      Next, operations of putting the print jobs in a print wait condition by allowing the control unit 9 to

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release the print request commands from the hold condition in accordance with the print request command sent out to the lp print service unit 6 and of printing the print jobs in the order of specific condition with reference flowcharts shown in Figs.6 and 7 will be described.

First, when the control unit 9 starts to operate, in Step S11, whether or not a print end signal representing the completion of printing print jobs has been received is checked, and if the signal is received (Y), the operation of the control unit 9 ends.

If the control unit 9 has not yet received the completion representing signal (N), the control unit 9 acquires from the print job information table 10 all the information that is stored (S12).

Here, whether or not job information entries exist on the print job information table 10 is determined here (S13). Namely, the control unit 9 can grasp the accepting condition of print jobs.

In addition, if there is no job information entry (N), the control unit 9 returns to an initial state, but if there is a job information entry (Y), the control unit 9 obtains job information from all the stored print files (S14).

Then, whether or not entries of print job information which is not stored are stored in the print job information table 10 is determined (S15).

In this step S15, if entries of print job information in association with the print files which are not stored are stored in the print job information table 10 (Y), the entries of print job information are deleted from the print job information table 10 (S16). Since there exists a case where a print file in question among the stored print files has already been printed and hence is deleted but still remains in the print job information table 10, the aforesaid operations are performed, and if entries of the entire print job information on the stored

print files are not stored (N), the above operations are not performed.

Next, the control unit 9 is informed whether or not the filter doing file exists in the device control filter 8 (S17). Then, if the filter doing file exists therein (Y), since the printer 2 is under processing, the control unit 9 returns to the initial state.

On the other hand, if no filter doing filter exists (N), this indicates that the printer 2 is in a wait condition. First, the hold release candidate is set "NO" (S18).

Then, the retrieval is sequentially performed for the entire print jobs (S19).

Whether or not the forced hold flag is 1 is checked  
15 with respect to the retrieved print jobs (S20). If the  
forced hold flag for the print job is not 1 (N), in other  
words, since this is a case where the user imparted a  
hold option, the process returns to Step S19, where the  
following print job is started to be retrieved, and  
20 whether or not the forced hold flag therefor is 1 is  
checked.

25 If the forced hold flag for the retrieved print job is 1 (Y), this indicates that the hold condition of the print job is not designated by the user but the hold option is added in the print job reading unit 5, and in this case, the process advances to the following step S21, where whether this print job is set as a "no" hold release candidate or the print job which is under processing in accordance with a set condition is given a higher priority than the print job set in the current hold release candidate, is determined.

Then, if there is no print job corresponding to the priority, in other words, in the case of "no" hold release candidate, the process returns to Step S19, where the retrieval of the following print job is started. On the contrary, if the print job corresponds to the condition (Y), the print job which is currently under



5

What is claimed is:

1. A processor comprising a processing unit for registering a print request command of an accepted print job, storing a print file of said print job and reading  
5 out print data of said file in accordance with said print request command and a device control filter for analyzing and processing said print data read out by said processing unit so as to output said print data so analyzed and processed to a printer, said processor being  
10 characterized in that;

said processing unit reads out sequentially said print data in accordance with said print request command for supply to said device control filter as a part of said file is started to be stored and  
15 then completes storing said file.

2. A processor as set forth in Claim 1, wherein said processing unit informs said device control filter that the storing of said file has been completed, and wherein said device control filter analyzes and processes  
20 for output until the end of print data of said file.

3. A processor as set forth in Claim 1, wherein said processing unit can accept and register a plurality of print jobs, and wherein said device control filter can analyze and process print data of respective print files  
25 read out in accordance with said print request command for output to a plurality of different printers.

4. A processor comprising a processing unit for registering a print request command of an accepted print job, storing a print file of said print job and reading  
30 out print data of said file in accordance with said print request command, whereby said print data read out by said processing unit is analyzed and processed for output to a printer, said processor being characterized in that;

said processing unit puts said print job  
35 in a print wait condition, releases the print job from said print wait condition by selecting said print request command in accordance with a specific condition for

determining an output sequence and reads out print data of said released print job for supply to said printer.

5            5.     A processor as set forth in Claim 4, wherein  
said processing unit does not release said print job from  
said print wait condition in a case where the analysis  
and process of print data is recognized as being under  
way.

6. A processor as set forth in Claim 4, wherein  
said processing unit can read out print data of said file  
for supply to said device control filter only when a  
requester of printing releases said print job from a hold  
condition in a case where said print job is accepted in  
the hold condition.

Parameter	Value	Unit	Parameter	Value	Unit
Initial concentration	1.0	g/L	Initial concentration	1.0	g/L
Initial pH	7.0		Initial pH	7.0	
Temperature	25	°C	Temperature	25	°C
Time	0, 1, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096, 8192, 16384, 32768, 65536, 131072, 262144, 524288, 1048576, 2097152, 4194304, 8388608, 16777216, 33554432, 67108864, 134217728, 268435456, 536870912, 1073741824, 2147483648, 4294967296, 8589934592, 17179869184, 34359738368, 68719476736, 137438953472, 274877906944, 549755813888, 1099511627776, 2199023255552, 4398046511104, 8796093022208, 17592186044416, 35184372088832, 70368744177664, 140737488355328, 281474976710656, 562949953421312, 1125899906842624, 2251799813685248, 4503599627370496, 9007199254740992, 18014398509481984, 36028797018963968, 72057594037927936, 144115188075855872, 288230376151711744, 576460752303423488, 1152921504606846976, 2305843009213693952, 4611686018427387904, 9223372036854775808, 18446744073709551616, 36893488147419103232, 73786976294838206464, 147573952589676412928, 295147905179352825856, 590295810358705651712, 1180591620717411303424, 2361183241434822606848, 4722366482869645213696, 9444732965739290427392, 18889465931478580854784, 37778931862957161709568, 75557863725914323419136, 151115727451828646838272, 302231454903657293676544, 604462909807314587353088, 1208925819614629174706176, 2417851639229258349412352, 4835703278458516698824704, 9671406556917033397649408, 19342813113834066795298816, 38685626227668133590597632, 77371252455336267181195264, 154742504910672534362390528, 309485009821345068724781056, 618970019642690137449562112, 1237940039285380274899124224, 2475880078570760549798248448, 4951760157141521099596496896, 9903520314283042199192993792, 19807040628566084398385987584, 39614081257132168796771975168, 79228162514264337593543950336, 158456325028528675187087900672, 316912650057057350374175801344, 633825300114114700748351602688, 1267650600228229401496703205376, 2535301200456458802993406410752, 5070602400912917605986812821504, 10141204801825835211973625643008, 20282409603651670423947251286016, 40564819207303340847894502572032, 81129638414606681695789005144064, 162259276829213363391578010288128, 324518553658426726783156020576256, 649037107316853453566312041152512, 1298074214633706907132624082305024, 2596148429267413814265248164610048, 5192296858534827628530496329220096, 10384593717069655257060992658440192, 20769187434139310514121985316880384, 41538374868278621028243970633760768, 83076749736557242056487941267521536, 166153499473114484112975882535043072, 332306998946228968225951765070086144, 664613997892457936451903530140172288, 1329227995784915872903807060280344576, 2658455991569831745807614120560689152, 5316911983139663491615228241121378304, 10633823966279326983230456482242756608, 21267647932558653966460912964485513216, 42535295865117307932921825928971026432, 85070591730234615865843651857942052864, 170141183460469231731687303715884105728, 340282366920938463463374607431768211456, 680564733841876926926749214863536422912, 1361129467683753853853498429727072845824, 2722258935367507707706996859454145691648, 5444517870735015415413993718908291383296, 10889035741470030830827987437816582766592, 21778071482940061661655974875633165533184, 43556142965880123323311949751266331066368, 87112285931760246646623899502532662132736, 174224571863520493293247799005065324265472, 348449143727040986586495598010130648530944, 696898287454081973172991196020261297061888, 1393796574908163946345982392040522594123776, 2787593149816327892691964784081045188247552, 5575186299632655785383929568162090376495104, 11150372599265311570767859136324180752990208, 22300745198530623141535718272648361505980416, 44601490397061246283071436545296723011960832, 89202980794122492566142873090593446023921664, 178405961588244985132285746181186892047843328, 356811923176489970264571492362373784095686656, 713623846352979940529142984724747568191373312, 1427247692705959881058285969449495136382746624, 2854495385411919762116571938898990272765493248, 5708990770823839524				

PROCESSOR

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ABSTRACT OF THE DISCLOSURE

10 In a print server device, print data reading and a  
printing process are performed in parallel so as to  
reduce the printing time and the printing order of print  
jobs is automatically or optionally changed.

15 A print server device 1 stores print data of a print  
job 3 accepted thereby, reads out the print data in  
accordance with a print request command and has the read  
out print data analyzed and processed at a device control  
filter 8 for output to a printer 2. A control unit 9  
sequentially reads out the print data for supply to the  
device control filter as a part of the print data is  
started to be stored. In addition, the control unit 9  
20 puts the print job in a print wait condition. The print  
jobs are selected in accordance with a priority following  
a specific condition so as to be released from the print  
wait condition, and the print data of the print files is  
read out for supply to the device control filter.

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Fig.2

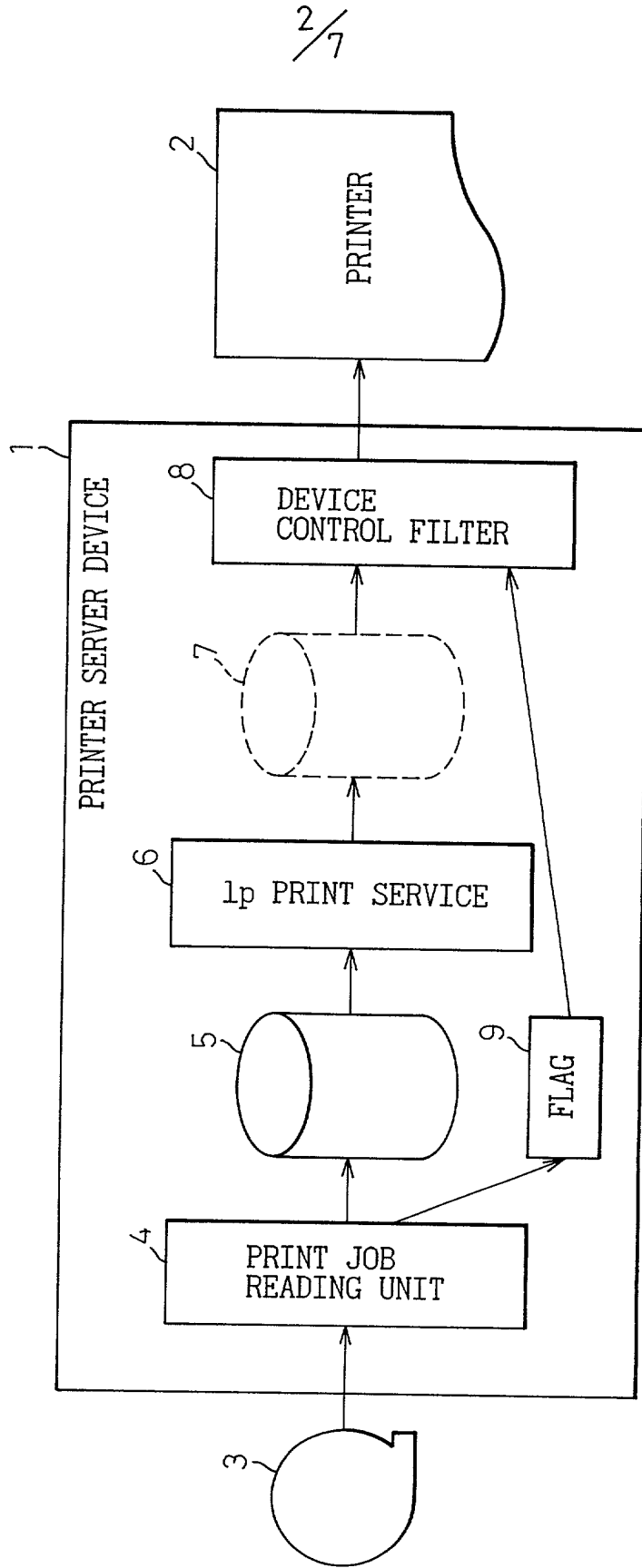


Fig.3

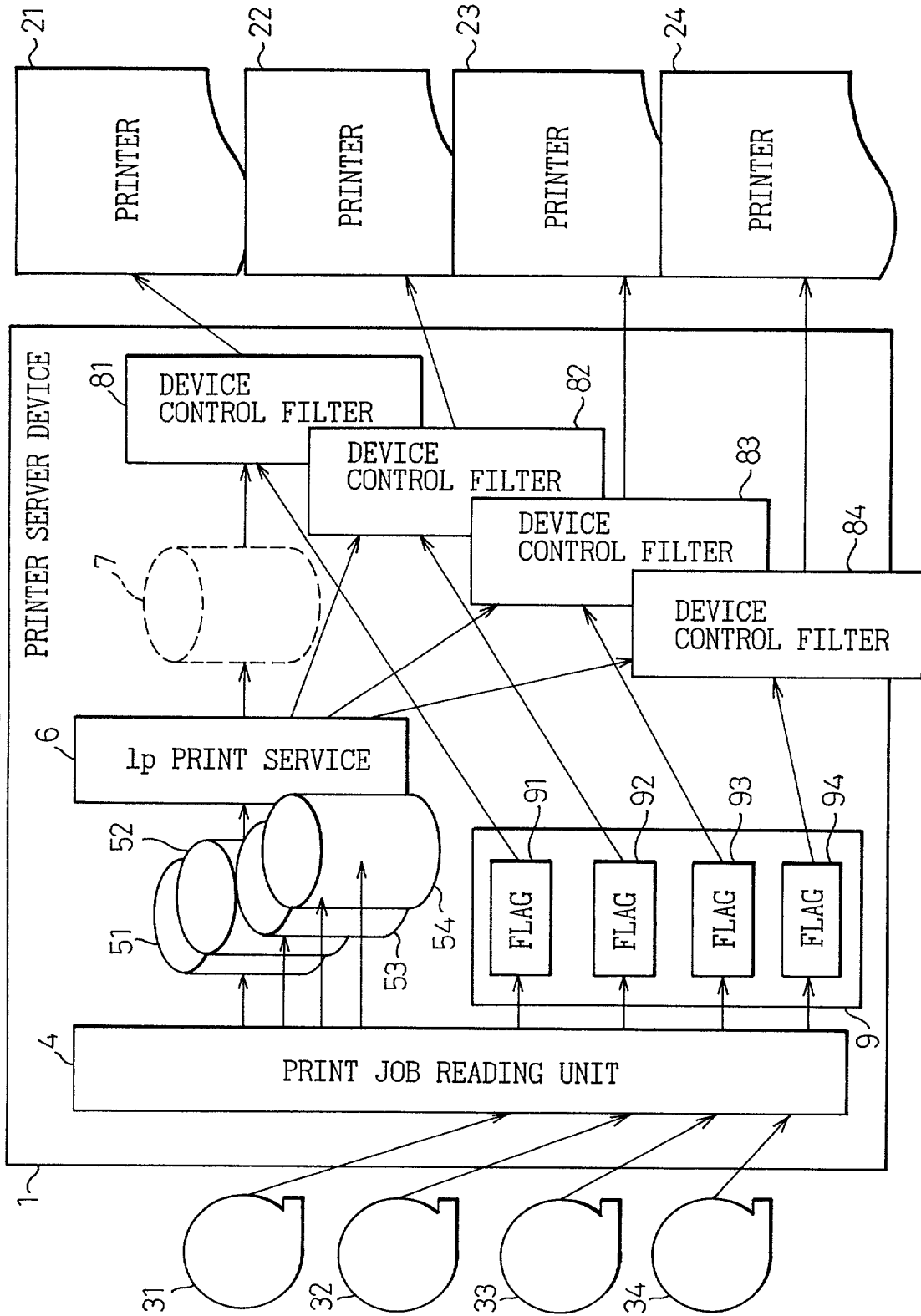




Fig.5

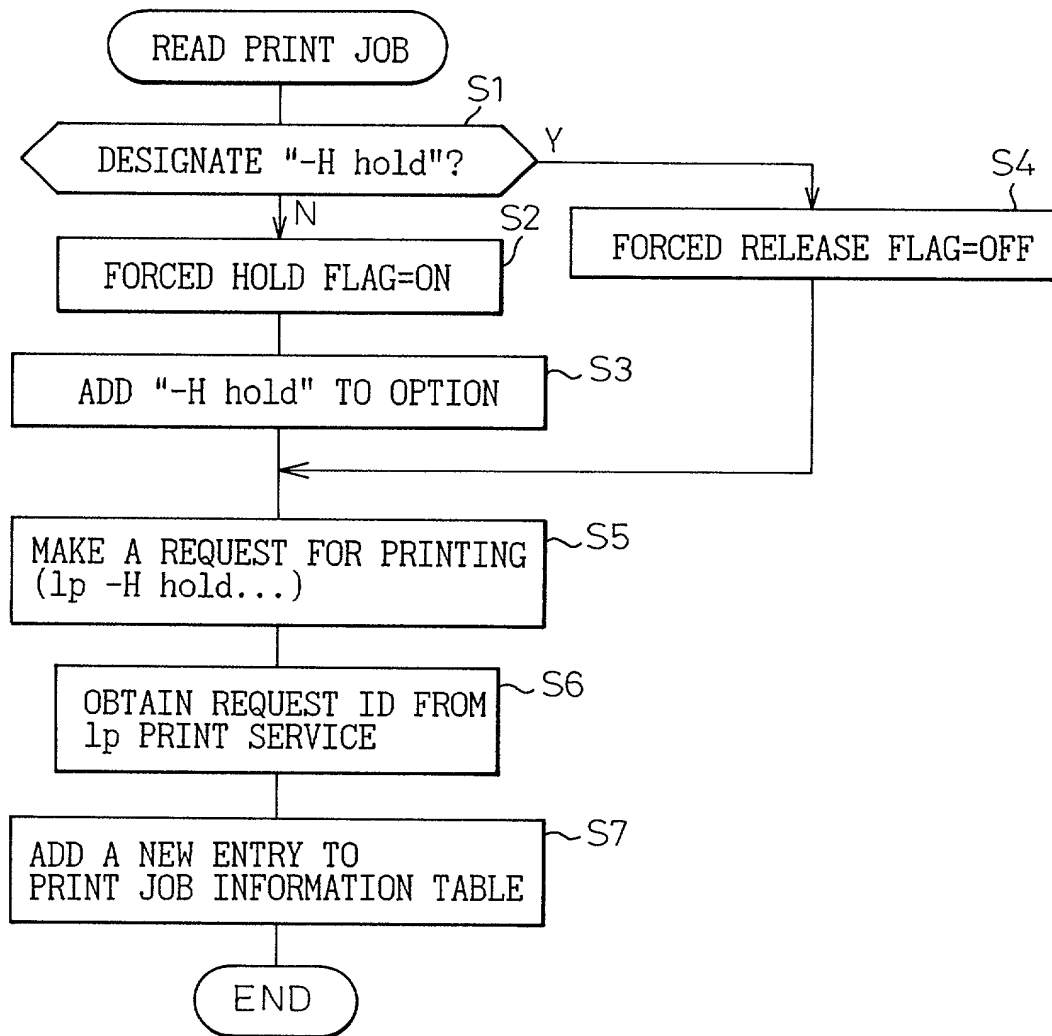


Fig.6

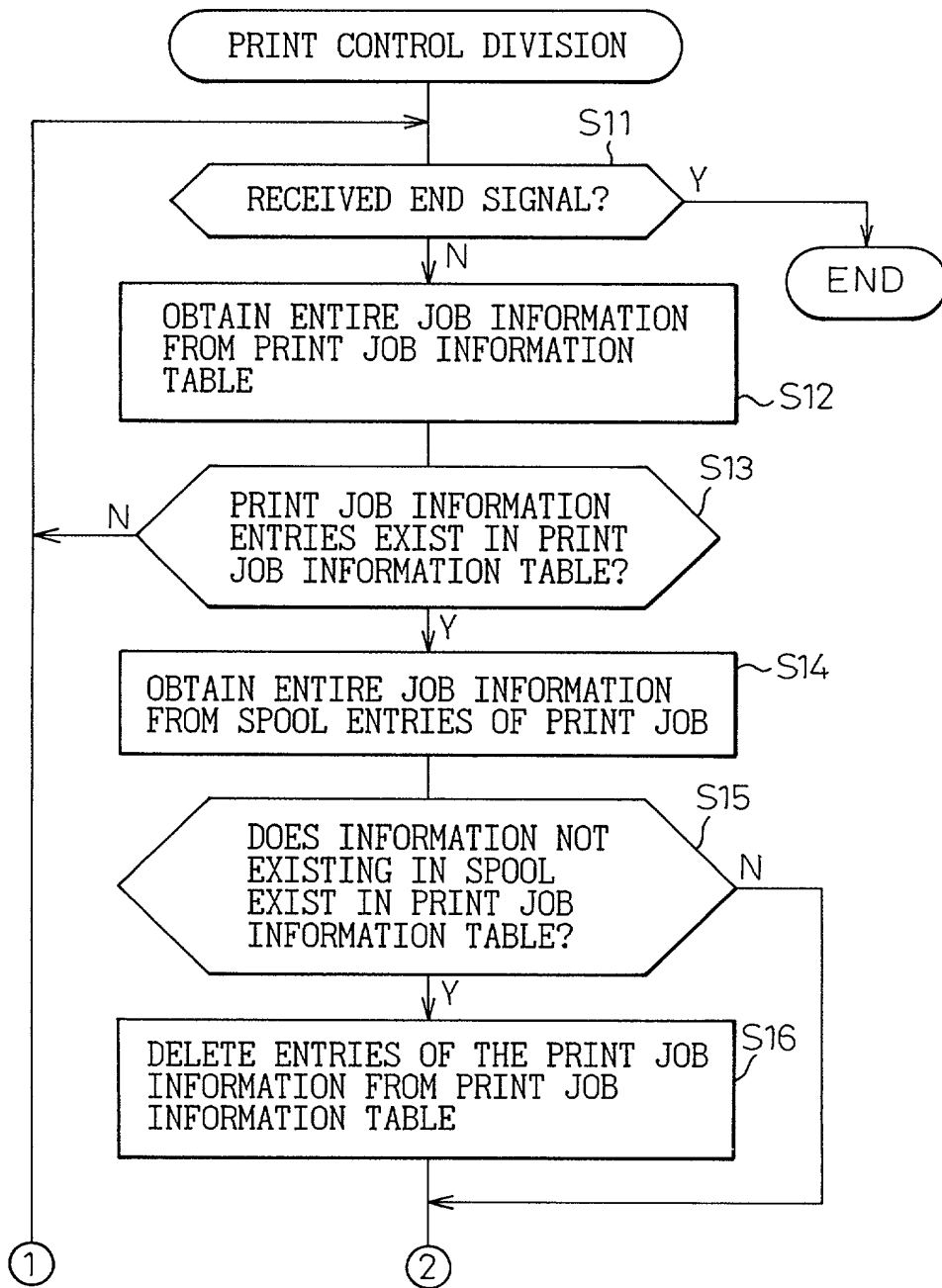
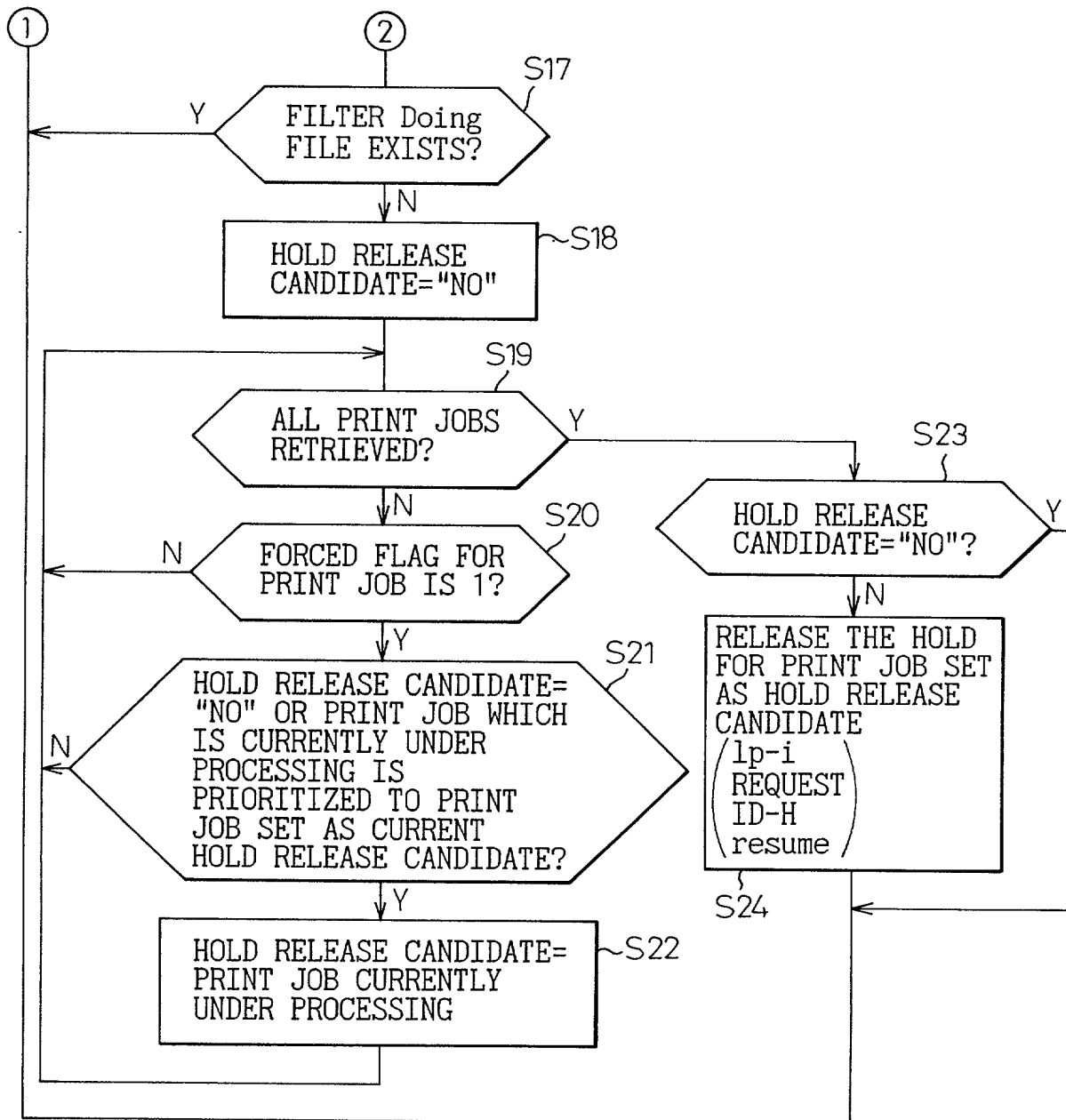


Fig.7



**Declaration and Power of Attorney for U.S. Patent Application**

特許出願宣言書及び委任状

**Japanese Language Declaration**

## 日本語宣言書

下記の氏名の発明者として、私は以下の通り宣言します。 As a below named inventor, I hereby declare that:

私の住所、私書箱、国籍は下記の私の氏名の後に記載された通りです。

My residence, post office address and citizenship are as stated next to my name.

下記の名称の発明に関して請求範囲に記載され、特許出願している発明内容について、私が最初かつ唯一の発明者（下記の氏名が一つの場合）もしくは最初かつ共同発明者であると（下記の名称が複数の場合）信じています。

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

PROCESSOR

上記発明の明細書（下記の欄でx印がついていない場合は、本書に添付）は、

the specification of which is attached hereto unless the following box is checked:

☐ 月 日に提出され、米国出願番号または特許協定条約国際出願番号を \_\_\_\_\_ とし、  
（該当する場合） \_\_\_\_\_ に訂正されました。

☐ was filed on \_\_\_\_\_  
as United States Application Number or  
PCT International Application Number  
\_\_\_\_\_ and was amended on  
\_\_\_\_\_ (if applicable).

私は、特許請求範囲を含む上記訂正後の明細書を検討し、内容を理解していることをここに表明します。

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

私は、連邦規則法典第37編第1条56項に定義されたとおり、特許資格の有無について重要な情報を開示する義務があることを認めます。

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

# Japanese Language Declaration (日本語宣言書)

私は、米国法典第35編119条(a)-(d)項又は365条(b)項に基づき下記の、米国外の国の少なくとも一カ国を指定している特許協力条約365(a)項に基づく国際出願、又は外国での特許出願もしくは発明者証の出願についての外国優先権をここに主張するとともに、優先権を主張している、本出願の前に出願された特許または発明者証の外国出願を以下に、枠内をマークすることで、示しています。

## Prior Foreign Application(s)

外国での先行出願  
2000-054172

(Number)  
(番号)

Japan

(Country)  
(国名)

29/February/2000

(Day/Month/Year Filed)  
(出願年月日)

Priority Not Claimed

優先権主張なし

☐

(Number)  
(番号)

(Country)  
(国名)

(Day/Month/Year Filed)  
(出願年月日)

☐

私と、第35編米国法典119条(e)項に基づいて下記の米国外の特許出願規定に記載された権利をここに主張いたします。

(Application No.)  
(出願番号)

(Filing Date)  
(出願日)

(Application No.)  
(出願番号)

(Filing Date)  
(出願日)

私は、下記の米国法典第35編120条に基づいて下記の特許出願に記載された権利、又は米国外を指定している特許協力条約365条(c)に基づき権利をここに主張します。また、本出願の各請求範囲の内容が米国法典第35編112条第1項又は特許協力条約で規定された方法で先行する米国外の特許出願に開示されていない限り、その先行米国外出願書提出日以降で本出願書の日本国内または特許協力条約国際提出日までの期間中に入手された、連邦規則法典第37編1条56項で定義された特許資格の有無に関する重要な情報について開示義務があることを認識しています。

(Application No.)  
(出願番号)

(Filing Date)  
(出願日)

(Status: Patented, Pending, Abandoned)  
(現況: 特許許可済、係属中、放棄済)

(Application No.)  
(出願番号)

(Filing Date)  
(出願日)

(Status: Patented, Pending, Abandoned)  
(現況: 特許許可済、係属中、放棄済)

私は、私自身の知識に基づいて本宣言書中で私が行なう表明が真実であり、かつ私の入手した情報と私の信じることに基づき表明が全て真実であると信じていること、さらに故意になされた虚偽の表明及びそれと同等の行為は米国法典第18編第1001条に基づき、罰金または拘禁、もしくはその両方により処罰されること、そしてそのような故意による虚偽の表明を行えば、出願した、又は既に許可された特許の有効性が失われることを認識し、よってここに上記のごとく宣誓を致します。

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.



**Japanese Language Declaration**  
(日本語宣言書)

委任状: 私は下記の発明者として、本出願に関する一切の手続きを米特許商標局に対して遂行する弁理士または代理人として、下記の者を指名いたします。(弁理士、または代理人の氏名及び登録番号を明記のこと)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith (list name and registration number)  
See list of attorneys and/or agents on page 5.

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第二共同発明者	Full name of second joint inventor, if any Akihiko Nakamaru		
第二共同発明者	日付	Second inventor's signature <i>Akihiko Nakamaru</i>	Date October 25, 2000
住所	Residence Kawasaki, Japan		
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(第三以降の共同発明者についても同様に記載し、署名をすること)

(Supply similar information and signature for third and subsequent joint inventors.)

第三共同発明者		Full name of third joint inventor, if any	
		Jin Kojima	
第三発明者の署名	日付	Third inventor's signature	Date
		<i>Jin Kojima</i>	October 25, 2000
住所	Residence		
	Yokohama, Japan		
国籍	Citizenship		
	Japanese		
私書箱	Post Office Address		
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	Yokohama-shi, Kanagawa 222-0033, Japan		
第四共同発明者		Full name of fourth joint inventor, if any	
第四発明者の署名	日付	Fourth inventor's signature	Date
住所	Residence		
国籍	Citizenship		
私書箱	Post Office Address		
第五共同発明者		Full name of fifth joint inventor, if any	
第五発明者の署名	日付	Fifth inventor's signature	Date
住所	Residence		
国籍	Citizenship		
私書箱	Post Office Address		
第六共同発明者		Full name of sixth joint inventor, if any	
第六発明者の署名	日付	Sixth inventor's signature	Date
住所	Residence		
国籍	Citizenship		
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